IN THE CLAIMS

Please amend the claims as shown in the following listing of claims, which replaces all prior versions and listings of claims in the present application:

1. (Currently amended) A method of processing a substrate in a process chamber comprising a wall, the method comprising:

providing a substrate in ~~a~~ the process chamber ~~having a wall that defines a chamber top surface~~, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by ~~applying an RF current through a multi-turn antenna above the chamber top surface of the wall of the process chamber to pass~~ passing RF energy through the wall of the process chamber to the gas inside the process chamber to energize the gas;

~~directing radiation onto the substrate surface through the chamber top surface and wall of the process chamber;~~

detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through the ~~chamber top surface and~~ wall;

~~collimating the detected radiation;~~ and

evaluating the detected ~~collimated~~ radiation to monitor the depth of a layer being processed on the substrate.

2. (Currently amended) A method according to claim 1 comprising energizing the gas by powering a multi-turn antenna ~~comprising a coil that spirals radially inward~~.

3. (Currently amended) A method according to claim 2 wherein the multi-turn antenna (1) covers a portion of a ceiling of the process chamber ~~the chamber top surface~~, (2) is non-vertical, or (3) comprises a coil.

4. (Currently amended) A method according to claim 2 wherein the multi-turn antenna covers a portion of a ceiling of the process chamber ~~the chamber top surface~~, and wherein the ceiling ~~chamber top surface~~ (1) is at least partially dome shaped, (2) comprises a ceramic, or (3) comprises a portion that is permeable to RF energy.

5. (Currently amended) A method according to claim 1 wherein the radiation propagating through the ~~chamber top surface and~~ wall comprises an optical beam.

6. (Previously presented) A method according to claim 1 wherein the wall comprises a window that (1) faces the substrate, (2) is permeable to X-rays, (3) is permeable to an optical beam, (4) comprises one or more of silica, sapphire or quartz, (5) is removable from the wall, or (6) is permanently affixed about an opening in the wall.

7. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly, and wherein the process monitoring assembly (1) is housed in an enclosure above the wall, (2) is adapted to be mounted above a window in the wall, (3) is mounted to allow line-of-sight view of the substrate in the process chamber, (4) is responsive to radiation, or (5) comprises an interferometer.

8. (Original) A method according to claim 1 comprising monitoring radiation propagating through the wall with a process monitoring assembly comprising a signal source, a signal detector, a collimating assembly and a radiation transmission cable connecting the collimating assembly to the signal source and signal detector, the radiation transmission cable having a bifurcated end.

9. (Original) A method according to claim 8 comprising connecting a first branch of the bifurcated end to the signal source and a second branch of the bifurcated end to the signal detector.

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90. (New) A method according to claim 1 comprising introducing an etching gas and energizing the etching gas to etch the substrate.

91. (New) A method according to claim 1 comprising applying an RF current through a multi-turn antenna above an external surface of a portion of a ceiling of the process chamber facing the substrate to inductively couple the RF energy through the portion of the ceiling of the process chamber to the gas inside the process chamber to energize the gas.

92. (New) A method according to claim 1 comprising directing radiation onto the substrate surface from directly above the surface of the substrate and through the external surface of the portion of the ceiling of the process chamber.

93. (New) A method according to claim 92 comprising detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through a window in the portion of the ceiling facing the substrate.

94. (New) A method according to claim 1 comprising collimating the detected radiation and evaluating the detected collimated radiation to monitor the depth of a layer being processed on the substrate.

95. (New) A method according to claim 1 comprising powering an antenna covering a portion of the wall of the chamber to couple the RF energy to gas in the chamber.

96. (New) A method according to claim 1 wherein the wall of the process chamber comprises an external top surface that is above the substrate, and wherein the method comprises coupling RF energy across a substantial portion of the external top surface to the gas in the chamber.

97. (New) A method according to claim 96 wherein the process chamber comprises a multi-turn antenna above the external top surface, and wherein the method comprises coupling RF energy thorough the external top surface by powering the multi-turn antenna.

98. (New) A method according to claim 1 wherein the wall of the process chamber is at least partially covered by a multi-turn antenna, and the chamber comprises a cathode within the chamber, and wherein the method comprises coupling RF energy to the gas in the chamber by applying RF currents to the cathode and multi-turn antenna.

99. (New) A method according to claim 1 wherein the wall of the process chamber is a flat wall and a multi-turn antenna at least partially covers the flat wall, and wherein the method comprises coupling energy across the flat wall to the gas in the chamber by powering the multi-turn antenna.

100. (New) A method according to claim 1 wherein the wall of the process chamber comprises a ceiling, and wherein the method comprises monitoring radiation from above the ceiling.

101. (New) A method according to claim 1 comprising coupling RF power to the gas by powering a non-vertical multi-turn antenna comprising a coil that spirals radially inward.

102. (New) A method according to claim 1 comprising coupling RF power to the gas by powering a non-vertical multi-turn antenna comprising a coil having separate turns, each turn having a different radius.

103. (New) A method according to claim 1 comprising detecting radiation propagating through a wall comprising a ceramic.

104. (New) A method according to claim 103 wherein the ceramic comprises alumina or silica.

105. (New) A method of processing a substrate in a process chamber, the process chamber comprising a wall and having a non-vertical multi-turn antenna above the wall, the method comprising:

placing in the process chamber, a substrate having a layer;

introducing a gas into the process chamber;

powering the non-vertical multi-turn antenna to couple energy through the wall to the gas inside the process chamber to energize the gas to process the layer on the substrate;

detecting radiation reflected from the substrate and propagating through the wall; and

evaluating the detected radiation to monitor the depth of the layer being processed on the substrate.

106. (New) A method of processing a substrate in a process chamber, the process chamber comprising a ceiling and an antenna above the ceiling, the method comprising:

providing a substrate in the process chamber, the substrate having a surface;

introducing a gas into the process chamber;

energizing the gas by applying an RF current to the antenna to pass RF energy through the ceiling of the process chamber to the gas inside the process chamber to energize the gas;

detecting radiation reflected from the substrate from directly above the surface of the substrate after the radiation propagates through the ceiling; and

evaluating the detected radiation to monitor processing of the substrate.